

## Two new species of the *Macrophya annulitibia* group (Hymenoptera: Tenthredinidae) from China

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**Abstract:** Two new species of the *Macrophya annulitibia* group in the genus *Macrophya* Dahlbom (Hymenoptera: Tenthredinidae) from China are described: *M. liufei* Li, Xie & Wei sp. nov. and *M. ludingensis* Li, Song & Wei sp. nov. Type specimens are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China.

**Key words:** Symphyta; Tenthredinoidea; taxonomy; sawflies

中国钩瓣叶蜂属环胫钩瓣叶蜂种团两新种（膜翅目：叶蜂科）

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**摘要：**记述采自中国钩瓣叶蜂属 *Macrophya* Dahlbom 环胫钩瓣叶蜂种团 *M. annulitibia* group 2 新种：刘氏钩瓣叶蜂 *M. liufei* Li, Xie & Wei sp. nov. 和泸定钩瓣叶蜂 *M. ludingensis* Li, Song & Wei sp. nov.。模式标本保存于中南林业科技大学昆虫模式标本室。

**关键词：**广腰亚目；叶蜂总科；分类；叶蜂

### Introduction

*Macrophya* Dahlbom, 1835, the third largest genus in the subfamily Tenthredininae (Hymenoptera: Tenthredinidae) contains 294 species worldwide (Li & Wei 2013; Li *et al.* 2013a, b, c, 2014a, b, 2016a, b, 2017a, b, 2018a, b, c; Liu *et al.* 2015a, b, 2016a, b, 2017a, b, 2018; Shinohara 2015; Shinohara & Li 2015; Shinohara & Yoshida 2015; Taeger *et al.* 2010; Wei *et al.* 2006, 2013). In China, 155 *Macrophya* species have been recorded (Li *et al.* 2012, 2013a, b, c, 2014a, b, 2016a, b, 2017a, b, 2018a, b, c; Li & Wei 2012, 2013; Liu *et al.* 2015a, b, 2016a, b, 2017a, b, 2018; Taeger *et al.* 2010; Wei *et al.* 2006, 2013; Wu *et al.* 2012; Zhang & Wei 2006; Zhao *et al.* 2010a, b; Zhao & Wei 2011; Zhu & Wei 2009; Zhu *et al.* 2012).

In China, thirteen of these species have been recorded: *M. annulitibia* Takeuchi, 1933; *M. brevicinctata* Li, Liu & Wei, 2016; *M. cloudae* Li, Liu & Wei, 2017; *M. gongshana* Li, Liu & Wei, 2017; *M. niuae* Li, Liu & Wei, 2017; *M. parapompilina* Wei & Nie, 1999; *M. pompilina*

Accepted 13 June 2018. Published 25 September 2018. Published online 28 August 2018.

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Malaise, 1945; *M. qinlingium* Li, Liu & Wei, 2016; *M. rugosifossa* Li, Liu & Wei, 2016; *M. shengi* Li & Chu, 2015; *M. spinoserrula* Li, Liu & Wei, 2017; *M. tenuisoma* Li, Liu & Wei, 2017 and *M. xinan* Li & Liu, 2015 (Takeuchi 1933; Li *et al.* 2017a; Liu *et al.* 2015a, 2016a; Malaise 1945; Wei & Nie 1999). *M. annulitibia* is also known from Japan, North Korea and East Siberia (Takeuchi 1933) and *M. gopeshwari* and *M. naga* occur in India (Saini *et al.* 1986; Saini & Vasu 1997). These species are similar in general morphology and form a distinct species group. The *M. annulitibia* group has been defined by Li *et al.* (2017b) and Liu *et al.* (2015a, 2016a).

In this study, two new species of the *M. annulitibia* group from China are described: *Macrophya liufei* Li, Xie & Wei sp. nov. and *M. ludingensis* Li, Song & Wei sp. nov. as new to science.

## Material and methods

Specimens were examined with a Motic-SMZ-168 stereomicroscope. Adult images were taken with a Nikon D700 digital camera and the series of images montaged using Helicon Focus (©HeliconSoft). All images were further processed with Adobe Photoshop CS 11.0®.

Morphological descriptions of new species are based on the holotype. The terminology of genitalia follows Ross (1945) and the general morphology follows Viitasaari (2002), although for a few terms (e.g. middle fovea and lateral fovea), we follow Takeuchi (1952).

The specimens examined in this study, including holotypes and paratypes of the two new species, are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China (CSCS).

## Taxonomy

### The *M. annulitibia* group

Diagnosis refers to Li *et al.* (2017a) and Liu *et al.* (2015a, 2016a).

#### 1. *Macrophya liufei* Li, Xie & Wei sp. nov. (Figs. 1–13)

Female. Body length 8 mm. Body black; following parts white to yellowish brown: palp largely, mandibles largely, labrum, clypeus except apical margin with black maculae, cenchri, apical margin of abdominal tergum 10, apical margins of all coxae, outer side with an oval macula of hind coxa, all trochanters, some stripes in anterior side of fore femur, base and small macula in anterior side apically of middle femur, basal 1/3 of hind femur, anterior sides of fore and middle tibiae, ventral sides and dorsal sides shortly of fore and middle tarsi, hind 2–4 tarsomeres and basal 1/2 of hind 5 tarsomere; hind tibia and metatarsus largely dark reddish brown, but apical 1/3 of hind tibia and basal margin of metatarsus with black maculae. Body hairs short and dense, silver; setae on sheath slightly vertical, pale blackish brown. Wings hyaline, without smoky macula, vein C pale yellowish brown, stigma and veins largely pale blackish brown (Fig. 1).

Dorsum of head less shiny; frontal area minutely and densely punctured; smooth interspaces between punctures very narrow, but microsculptures fine (Fig. 3); labrum and clypeus less shiny, labrum with some shallow punctures, clypeus with some shallow and large

punctures, microsculptures fine. Thorax less shiny, punctures in lateral corners on pronotum minute and dense, microsculptures fine; mesonotum less shiny, punctures on mesonotum smaller than punctures on head, without smooth interspaces between puncture, but with fine microsculptures; mesoscutellum less shiny, peak with some large and shallow punctures, microsculptures clear, all round and slightly dense; mesoscutellar appendage less shiny, with minute punctures and distinct microsculptures; metasutellum less shiny, without puncture, but microsculptures fine. Mesopleuron less shiny, mesepisternum with dense and coarse punctures slightly, smooth interspaces between puncture narrow, but with fine microsculptures; anepimeron dull, with coarse wrinkles; anterior margin of katepimeron smooth and very shiny, without puncture or microsculpture, posterior parts largely of katepimeron with some shallow punctures, dorsal side with some coarse punctures; metepisternum dull, with minute punctures, microsculptures fine; metepimeron shiny, most parts with some punctures and weak microsculptures; metepimeronal appendage small and hardly smooth, without puncture or sculpture (Fig. 6). All abdominal terga slightly shiny, two lateral sides of abdominal tergum 1 with some shallow punctures, central parts of abdominal tergum 1 with fine microsculptures; other abdominal terga with minute and shallow punctures, microsculptures weak. Outer side of hind coxa with slightly dense and minute punctures, ventral side of hind coxa and outer side of hind femur with some minute punctures and fine microsculptures. Surface of sheath coriaceous, with indistinct punctures and fine microsculptures.

Labrum slightly flat, anterior margin of labrum truncate; clypeus weakly elevated, about 2 times broader than long, base broader than distance between lower corner of eyes; lateral sides distinctly convergent forwards, anterior margin shallowly incised to approximately 1/3 length of clypeus, lateral corners slightly acute, lobe margin sub-square (Fig. 4); malar space broad linear, approximately 0.5 times as broad as diameter of middle ocellus; frontal area and face weakly elevated; middle fovea weak, lateral foveae clear, short furrow-like; interocellar furrow shallow, postocellar furrow weak; POL : OOL : OCL = 4 : 14 : 9; postocellar area elevated, about 2.5 times broader than long; lateral furrow slightly broad and shallow, divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete (Fig. 3). Antenna slender, approximately 1.3 times length of head and thorax together, approximately 0.93 times longer than abdomen; antennomere 2 approximately 1.3 times as long as breadth; antennomere 3 approximately 1.43 times as long as antennomere 4 (10 : 7), approximately 0.74 times as long as antennomeres 4 and 5 together (20 : 27), middle antennomeres not inflated, subapical antennomeres not compressed (Fig. 5). Mesoscutellum roundly elevated, without peak and carina, but with middle furrow; as high as top of mesonotum in lateral view; mesoscutellar appendage with acute middle carina; metascutellum with short and lower carina; dorsal-posterior platform of mesepimeron as broad as diameter of middle ocellus; metepimeronal appendage small platform distance between cenchri 2 times breadth of a cenchrus; mesopleuron and metapleuron as shown in Fig. 6. Inner tibial spur of hind leg 0.64 times length of hind metabasitarsus (9 : 14), hind metabasitarsus slender, about 1.14 times longer than following 4 tarsomeres together (42 : 37); claw with inner tooth slightly shorter than outer tooth. Ovipositor sheath clearly shorter than hind metabasitarsus (29 : 42), apical sheath slightly longer than basal sheath (16 : 13), setae on sheath slightly curved in dorsal view, apical margin round in lateral view (Fig. 7). Fore wing with crossvein cu-a joining cell 1M at basal 2/5, crossvein 2r joining cell 2Rs at apical 2/5, cell 2Rs clearly longer than

cell  $1R_1$ , middle petiole of anal cell 2.2 times longer than crossvein  $1r-m$ , 1.5 times longer than vein  $cu-a$ ; without middle petiole of anal cell in hind wing. Lancet narrow and long, with 17 serrulae (Fig. 8), annuli sub-triangular, lancet clearly protruding and oblique, middle serrulae distinctly papillose-like, each with 1 to 2 proximal and 4 to 6 distal teeth, subbasal teeth small and short, annular spine bands narrow, the 7th to 9th serrulae at base as shown in Fig. 9.



Figures 1–13. *Macrophya liufei* Li, Xie & Wei sp. nov.. 1. Female adult, dorsal view, holotype; 2. Male adult, dorsal view, paratype; 3. Head of female, dorsal view, holotype; 4. Head of female, anterior view, holotype; 5. Antenna of female, holotype; 6. Mesopleuron and metapleuron of female, holotype; 7. Ovipositor sheath, lateral view, holotype; 8. Lancet, holotype; 9. The 7th–9th serrulae, holotype; 10. Head of male, anterior view, paratype; 11. Antenna of male, paratype; 12. Penis valve, paratype; 13. Gonoforceps, paratype.

Male. Body length 6–6.5 mm (Fig. 2). Body color and structure similar to female; following parts pale yellowish brown: lateral margins and posterior margin of pronotum, outer side of tegula, ventral side of fore coxa, apical parts largely of middle coxa and apex of hind coxa; clypeus sub-arc, anterior margin shallowly incised to approximately 1/4 length of clypeus, lateral corners obtuse (Fig. 10); lateral view of antennae as in Fig. 11; subgenital plate longer than broad, apical margin roundish; base slightly broader than apex of harpe, inner side in base not protruding, gonoforceps as in Fig. 13; penis valve without ergot (Fig. 12).

**Holotype.** ♀, **China**, Ningxia, Mt. Liupan, Longtan, N. 35°23.380', E. 106°20.701', alt. 1945 m, 03-VII-2008, Fei LIU leg. **Paratypes.** 1♂, **China**, Ningxia, Mt. Liupan, Fengtai, N. 35°23.380', E. 106°20.701', alt. 1945 m, 24-VI-2008, Fei LIU leg.; 1♂, **China**, Shanxi, Mt. Lishan, Huangguman, N. 35°21.525', E. 111°56.310', alt. 2090 m, 11-VI-2009, Xiaohua WANG leg.; 1♀, **China**, Shanxi, Mt. Lishan, Huangguman, N. 35°21.525', E. 111°56.310', alt. 2090 m, 13-VI-2009, Xiaohua WANG leg.; 1♂, **China**, Hubei, Mt. Shennongjia, 07-VI-2010, Maoling SHENG leg.; 3♂, **China**, Hubei, Mt. Shennongjia, 05–15-VII-2010, Maoling SHENG leg.; 1♀, **China**, Gansu, Linxia City, Mt. Taizi, Diaoqi Forest Farm, N. 35°14.202', E. 103°25.314', alt. 2500 m, 10-VII-2010, Zejian LI leg.; 1♀, **China**, Hubei, Yichang City, Mt. Shennongjia, Yazikou, N. 31°30.104', E. 110°20.986', alt. 1920 m, 26-V-2011, CSCS11025, Zejian LI leg.; 1♀, **China**, Hubei, Yichang City, Mt. Shennongjia, Banbiyan, N. 31°27.499', E. 110°13.353', alt. 2590 m, 20-VII-2011, CSCS11129, Zejian LI & Yao LIU leg.; 1♀, **China**, Tibet, Bomi County, 24K, N. 29°48.287', E. 95°41.914', alt. 3563 m, 21-VI-2009, Meicai WEI leg.; 1♀, **China**, Tibet, Motuo County, 52K, N. 29°48.287', E. 95°41.914', alt. 3563 m, 17-VI-2009, Meicai WEI leg.; 1♂, **China**, Hubei, Mt. Shennongjia, 15-VII-2010, Maoling SHENG leg.

Etymology. The species epithet “*liufei*” is derived from the collector Dr. Fei LIU.

Diagnosis. This new species is a member of the *M. annulitibia* group and is similar to *M. annulitibia* Takeuchi, 1933 from China (Jilin) and Japan, but differs from the latter in having the anterior margin of clypeus shallow triangular, incised to 1/3 length of clypeus; postocellar area 2.5 times broader than long; basal 2/3 of hind tibia reddish brown, apical 1/3 black; hind metabasitarsus largely reddish brown, apex with black macula; cell 2Rs in fore wing clearly longer than cell 1Rs. In *M. annulitibia*, the anterior margin of clypeus arc deeply, incised to 2/5 length of clypeus; postocellar area 2 times broader than long; hind tibia largely black, middle 1/3 with broad yellowish white ring; hind metabasitarsus entirely black; cell 2Rs in fore wing slightly longer than cell 1Rs.

Distribution. China (Gansu, Ningxia, Shanxi, Hubei, Tibet).

## 2. *Macrophya ludingensis* Li, Song & Wei sp. nov. (Figs. 14–21)

Female. Body length 9.5 mm. Body and legs black; following parts white: palp, basal half of mandibles, labrum, apical 2/3 of clypeus, outer side of tegula, narrow band in posterior margin at center of abdominal tergum 1, ventral side of fore coxa, outer side of middle coxa, apical margin and a long stripe in base of hind coxa; ventral sides of fore and middle trochanters, hind trochanter largely (ventral side with weak black maculae), some stripes in anterior side of fore and middle femur, basal margin of hind femur, anterior side of fore tibia, some stripes in dorsal side of hind metabasitarsus, base largely of tarsomeres 2–3 and base of tarsomere 5. Body hairs short and dense, silver; setae on sheath dense, pale blackish brown.

Wings hyaline, without smoky macula, stigma and veins largely pale blackish brown (Fig. 14).

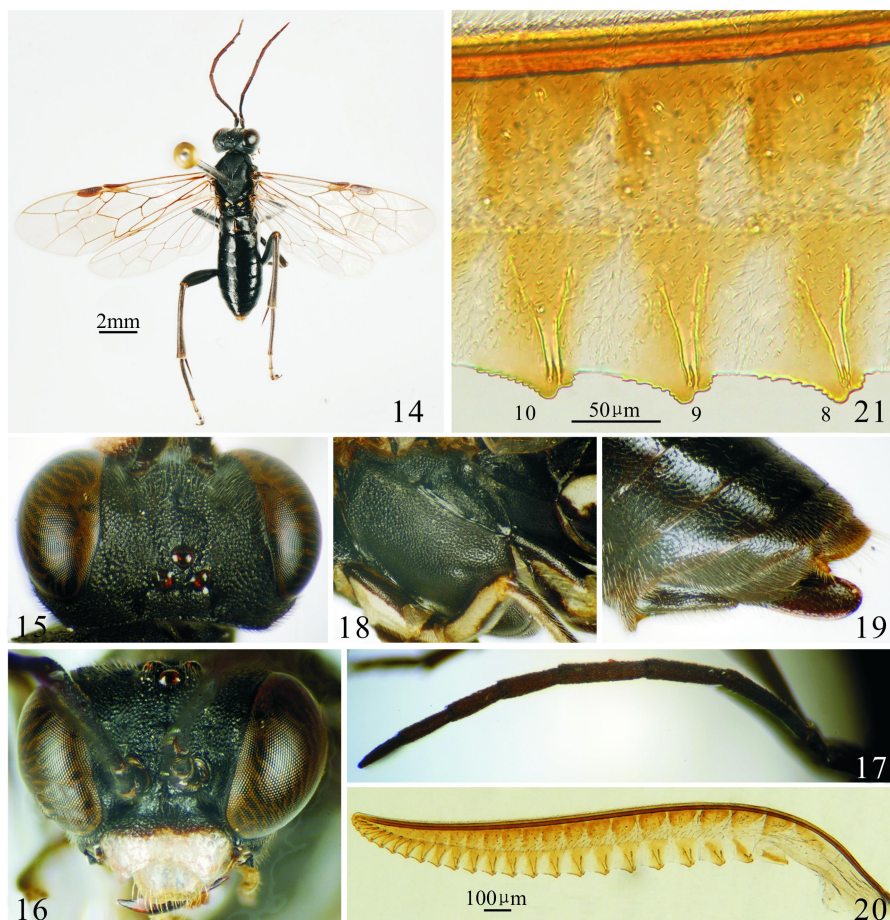
Dorsum of head less shiny; frontal area minutely and densely punctured; without smooth interspaces between punctures (Fig. 15); labrum and clypeus shiny, labrum and apical 2/3 of clypeus with some shallow and large punctures, microsculptures fine; basal 1/3 of clypeus with dense punctures. Thorax less shiny, punctures on pronotum minute and dense, anterior corners with clear microsculptures, lateral corners and posterior margin with fine microsculptures; mesonotum dark, punctures on mesonotum smaller than punctures on head, without smooth interspaces between punctures, but with fine microsculptures; mesoscutellum less shiny, peak with some large and shallow punctures; mesoscutellar appendage and metascutellum less shiny, with some minute punctures; less shiny, microsculptures weak. Mesopleuron less shiny, mesepisternum with dense and coarse punctures, smooth interspaces between puncture narrow, punctures on upper half area of mesepisternum slightly larger than lower half area; anepimeron dull, with coarse wrinkles; anterior margin of katepimeron smooth and very shiny, without puncture or microsculpture, posterior parts largely of katepimeron with some shallow large punctures; metepisternum dull, with minute punctures; metepimeron shiny, depressed area and dorsal side with some shallow large punctures and weak microsculptures; anterior margin of metepimeronal appendage very smooth, middle parts depressed clearly, all around with fine microsculptures (Fig. 18). All abdominal terga shiny, two lateral sides of abdominal tergum 1 with some shallow punctures, central parts of abdominal tergum 1 with fine microsculptures; other abdominal terga with minute and shallow punctures, microsculptures weak. Outer side of hind coxa with slightly dense and minute punctures, ventral side of hind coxa and outer side of hind femur with some minute punctures and fine microsculptures. Surface of sheath coriaceous, with indistinct punctures and fine microsculptures.

Middle parts of labrum slightly elevated, anterior margin of labrum truncate, middle in anterior margin with small gap; clypeus weakly elevated, base clearly broader than distance between lower corner of eyes; lateral sides distinctly convergent forwards, anterior margin arc and shallowly incised to approximately 1/4 length of clypeus, lateral corners slightly short, lobe margin obtuse (Fig. 16); malar space broad linear, approximately 0.4 times as broad as diameter of middle ocellus; frontal area and face weakly elevated, as high as top of eyes in lateral view; middle fovea weak, lateral foveae clear, short furrow-like; interocellar furrow shallow, postocellar furrow weak; POL : OOL : OCL = 4.5 : 13 : 9; postocellar area flat, about 2.2 times broader than long; lateral furrow slightly broad and deep, divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete (Fig. 15). Antenna slender, approximately 1.7 times length of head and thorax together, as long as abdomen; antennomere 2 approximately 1.67 times as long as breadth; antennomere 3 approximately 1.43 times as long as antennomere 4 (10 : 7), approximately 0.74 times as long as antennomeres 4 and 5 together (20 : 27), middle antennomeres clearly inflated, subapical antennomeres not compressed (Fig. 17). Mesoscutellum roundly elevated, with weak peak, without carina, slightly higher than top of mesonotum in lateral view; mesoscutellar appendage and metascutellum with slightly acute middle carina; dorsal-posterior platform of mesepimeron 0.9 times broader than diameter of middle ocellus; metepimeronal appendage small platform distance between cenchri 2 times breadth of a cenchrus; posterior corner of metepimeronal appendage extended, platform-like, middle parts deep, without long hair, mesopleuron and



metapleuron as shown in Fig. 18. Inner tibial spur of hind leg 1.44 times length of hind metabasitarsus (23 : 36), hind metabasitarsus slender, about 1.08 times longer than following 4 tarsomeres together (72 : 67); claw with inner tooth broader and longer than outer tooth. Ovipositor sheath clearly shorter than hind metabasitarsus (19 : 24), apical sheath slightly shorter than basal sheath (9 : 10), setae on sheath slightly curved in dorsal view, apical margin round in lateral view (Fig. 19). Fore wing with crossvein cu-a joining cell 1M at basal 1/3, crossvein 2r joining cell 2Rs at apical 3/8, cell 2Rs slightly shorter than cell 1Rs, vein 2r-m slightly oblique; middle petiole of anal cell 1.35 times longer than vein cu-a; without middle petiole of anal cell in hind wing. Lancet narrow and long, with 22 serrulae (Fig. 20), lancet slightly protruding and oblique, middle serrulae each with 2 proximal and 7 to 9 distal teeth, subbasal teeth small and short, annular spine bands narrow, the 8th to 10th serrulae at base as in Fig. 21.

Male. Unknown.



Figures 14–21. *Macrophya ludingensis* Li, Song & Wei sp. nov., ♀, holotype. 14. Dorsal view; 15. Head, dorsal view; 16. Head, anterior view; 17. Antenna; 18. Mesopleuron and metapleuron; 19. Ovipositor sheath, lateral view; 20. Lancet; 21. The 8th–10th serrulae.

**Holotype.** ♀, **China**, Sichuan, Luding County, Mt. Hailuoguo, alt. 2200–2600 m, 17-VII-2003, Wei XIAO leg.

**Etymology.** The species epithet “*ludingensis*” is derived from the type locality of the new species collected in Luding County of Sichuan Province, China.

**Diagnosis.** This new species is a member of the *M. annulitibia* group and is similar to *M. niuae* Li, Liu & Wei, 2017 from Sichuan, China, but differs from the latter in having the labrum, apical 2/3 of clypeus and outer side of tegula white; ventral side of fore coxa, outer side of middle coxa and ventral sides of fore and middle trochanters white; hind trochanter largely white, ventral sides with weak black maculae; fore and middle tarsi shortly, some stripes in dorsal side of hind metabasitarsus, base largely of tarsomeres 2–3 and base of tarsomere 5 white; middle parts of metepimeronal appendage deep; lancet long, middle serrulae each with 2 proximal and 7 to 9 distal teeth, serrulae slightly protruding. In *M. niuae*, the labrum, clypeus and tegula entirely black; fore and middle coxae and trochanters entirely black; hind trochanter entirely black; fore and middle tarsi 3–4 and base of tarsus 5, apical half of hind tarsus 2, hind tarsi 3–4 and base of hind tarsus 5 white; middle parts of metepimeronal appendage shallow; lancet short, middle serrulae each with 2 proximal and 4 to 6 distal teeth, serrulae distinctly protruding and papillose-like.

**Distribution.** China (Sichuan).

## Acknowledgements

The authors are deeply grateful to anonymous referees for valuable comments and suggestions. This research was partly supported by the Natural Science Foundation of Zhejiang Province (LY18C040001), the National Natural Science Foundation of China (31672344, 31501885) and the open fund from Common College Key Laboratory of Insect Systematic Evolution and Integrated Management of Hunan (010211), Central South University of Forestry and Technology.

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